

REVIEW OF A PROCESS PRIORITIZATION IN MASS CUSTOMIZATION

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Abstract

Purpose – The present article aims to analyze the content of process prioritization methods and possibilities of its application in the context of Mass Customization.

Design/methodology/approach – As the analysis is based on exploratory approach, qualitative methodology is the main tool used in the research. Moreover, author do not aim at providing conclusive answers to research questions; in opposition, generating relevant insights about a current situation is a goal.

Findings – Results suggest that prioritization methods and principles are compatible, necessary and can be successfully applicable to Mass Customization at different process stages or even this concept types. In addition, this research reveals the need to have a combined and multidimensional prioritization at the beginning of Mass Customization processes.

Research limitations/implications – Main research limitations can be divided into two parts. Firstly, when prioritization is taken into consideration, it is noticed that a limited scope of research focus on combined prioritization models as well as their effect on organizations results, especially in Public and Non-governmental sector. Secondly, in a case of concept of Mass Customization and its analysis, scientific discussions show extremum transitions to Big Data, Internet platform capabilities and overall customer flow management via modern economic theories in the last decades. Therefore, a lack of sufficient scientific attention to important parts of prioritization severely affect customer input, Design and Infrastructure of Mass Customization. In addition, both parts require not only proper understanding of the theoretical background but also following detail description of practical implication tools and guidelines as well as defining possible application effect. Since this article is based on the theoretical literature review, case studies and comparative analysis towards a practical implication are elaborated briefly.

Practical implications – This research may serve as relevant insights into the context of the Mass Customization system and processes, where organizations constantly cope with prioritization by making a number of decisions on product selection, specifications, quantities, or pricing. From the perspective of process prioritization, the research serves as a concise review of main quantitative and qualitative methods, showing their demand of alignment and effect for Mass Customization.

Originality/Value – The main value of the presented article can be described as a holistic theoretical focus on different types of prioritization methods and underlying points where it takes effect in Mass Customization concept. Moreover, the selected research object and findings are also valuable and applicable for organizations of different type, sector and working field.

Keywords: process prioritization, optimization, combined methods, Mass Customization.

Research type: general review.

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Introduction

Process and resource prioritization and optimization are recognized as valuable and significant components of current production and supply chain as well as parts of their future

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projections (Masoumik et al., 2015). In parallel, harmonization between organization activities and environment is important too, where resources are used at the most appropriate ratio regarding quality and quantity costs, environmental impact and value co-creation process (Nielsen and Fei, 2015; Weyer et al., 2015). In this way, an optimal financial and non-financial return is ensured as well as rationally and efficiently allocated resources, time and individualized solutions for the best consumer experience are brought out (Baliukonis and Čiarnienė, 2014; Malenje et al., 2014). Nevertheless, together with a bunch of advantages, prioritization might come with persistently occurring mistakes related to inappropriate risks mitigation and assessment actions, which might lead to a negative financial and reputational impact on organizations or stakeholders. It should be noted that both in practice and in scientific research, organizations at this point are often referred to a homogeneous position of assessment, for instance, solely relying on the quantitative calculation of Full Time Employee (FTE) or Return of Investment (ROI) as sufficient indicators for prioritizing activities and resources (Duan et al., 2009). However, qualitative indicators such as customer experience or employee satisfaction, impact for brand, level of human resource involvement and network indicators such as process and system hierarchy and compatibility are not sufficiently taken into account (Tomov, 2017; Kadoić et al., 2017).

Thus, in summary, it can be stated that in modern organizations, especially in the Public and Non-governmental sectors, there is a lack of combined knowledge and skills of process prioritization and Mass Customization, and missing an general holistic and harmonized attitude to assessment of related risks (Rakšnys, 2016; Neațu, 2015; Orošnjak et al., 2017). Therefore, this research focus on quantitative and qualitative aspects of prioritization, its relevance and applicability in the Mass Customization concept. Following key points of the problematic approach in the topic area, authors generally stand for a multidimensional assessment need, and suggest to focus on a combination of microanalysis that evaluates each process or resource individually (its characteristics, structure and specificity) and macro-analysis that focuses on evaluation of all processes (their networks, relations and influence to each other) (Almeida, 2012; Tomov, 2017; Kadoić et al., 2017). From the point of scientific research field, it should be mentioned that the topic of prioritization is extensively analyzed in the context of process planning, automation and resources optimization, but it is not sufficiently explored in the context of Mass Customization (An et al., 2015; Feng et al., 2009; Kirkham et al. 2014).

1. Theoretical background

The present article is based on an analysis of two theoretical research backgrounds: the concept of Mass Customization and the process prioritization methods and principles.

The Mass Customization is mostly focused on presenting the traditional semantical meaning of the concept with drawing attention towards recent tendencies within this field – an increased trend of data analytics, electronic mass customization and its content. In addition, a short comparative analysis is carried out focusing on different types of concept alignment with prioritization methods and their influence. This part is completed by following researches: Spahi (2008), Feng et al. (2009), Pourabdollahian et al. (2013), Liu et al. (2014); An et al. (2015), Jiang et al. (2015), Skačkauskienė and Davidavičius (2015), Park and Yoo (2016), Xu et al. (2016), Zawadzki and Żywicki (2016), Orošnjak et al. (2017), Amadoa et al. (2018), and Blazquez and Domenech (2018).

The process prioritization methods and principles are based on revealing the qualitative type of prioritization need as well as showing compatibility with standard quantitative methods and Mass Customization types. This part is completed by following works of Duan et al. (2009), Kumar and Piller (2009), Barnett and Mattoy (2010), Garvey et al. (2011), Maren et al. (2012), Kevin (2012), de Oliveira Almeida et al. (2012), Barone et al. (2014), Čiarnienė and Baliukonis (2014), Kirkham et al. (2014), Ohlsson et al. (2014), Ortega et al. (2014), Ziem et al. (2014), Masoumik et al. (2015), Nielsen and Fei (2015), Babashams et al. (2016), and Kadoić et al. (2017).

2. Research methodology

The strategy of this particular research can be described as qualitative supporting an descriptive-exploratory type of scientific document content analysis. For this reason, it should be noted that the findings are of a limited scope and cannot be generalized to other contexts. Moreover, main methods used in analysis are scientific literature review, qualitative document content analysis, comparative analysis. Data collection is based on scientific literature of the last 10 years with key orientation to 3 topics in sequence of analysis as follows: 1) defining main points in semantical meaning of Mass Customization concept; 2) Analyzing the content of qualitative and quantitative prioritization methods and overall prioritization procedure; 3) Revealing the influence of prioritization related activities to the customers and organizations in the context of Mass Customization concept.

3. Results

3.1.Key points in semantical evaluation of Mass Customization

In the digital society where knowledge and information have become inseparable to economy, organizational performance, brand and overall competitive advantage are increasingly becoming dependent on the proper management of customer data and its application at operational and

strategic levels (Blazquez and Domenech, 2018). In practice, this is illustrated by an increased level of attention and resources delegated to observation of user behavior and flow in online platforms as well as analysis of related data, and integration of results into existing organizational structure, systems and processes, with a view to the future (Amadoa et al., 2018). All aspects mentioned precedingly lead to transformation of the approach towards process and project management as well as a practical transition from mass production to mass customization. However, in parallel, new type of issues might stand out such as a significant lack of knowledge of complex and aligned management methods, struggle in finding proper IT solutions and applying them in practice, a high need of effective prioritization of activities and resources (Lorange, 2017; Masoumik et al., 2015).

Taking into consideration this concept retrospectively, it should be noted that in practice Mass Customization concept has been applied since the last decade of the 20th century. From the semantical point of view, the concept is related to acquisition of competitive advantage through the orientation towards combinations of technological innovations and management methods and their adaptation to the client-oriented service ideology. To be more specific, a clear aim is determined where a maximum diversity of production and services supply is set as a goal, while maintaining harmonization at the best ratio between operational costs and high quality parameters, which, importantly, must be acceptable both by the organization and its customers (Skačkauskienė and Davidvičius, 2015; Orošnjak et al. 2017). In addition, it should be mentioned that tendencies of intensive development of information technology and innovation practices in organizations over the last decade have had a strong impact on the content of mentioned concept: not only the wide application of combined (integrated) management methods is captured, but also is the transition to modern economic theories of consumer behavior, data analytics and their practical implementation (Zawadzki and Żywicki, 2016; Xu et al., 2016). Continuing the semantic evaluation and considering the above-mentioned tendencies and factors, it must be pointed out that, in parallel, the term of electronic mass customization (e-mass customization) is widely escalated too (Park, Yoo, 2016). Thus, this approach combines features of development of information and communication technologies, general tendencies of digitalization at processes and systems level and the traditional content of this concept. In detail, orientation to 3 main components is maintained: product and service individualization, two-way communication with the customer, and appropriate price versus quality ratio assurance (Skačkauskienė and Davidvičius, 2015). In the case of e-mass customization, it is necessary to identify terms of Big Data and data analytics as well as the assessment of consumer's financial behavior as a significant and exclusive content element (Blazquez and Domenech, 2018). In addition, using digital tools and resources not only create new possibilities to make data flow analysis, but also get customers' feedback or involve them in different process steps too (Jiang et al., 2015; Park and Yoo, 2016). As seen from the semantical

evaluation, a number of different features and their complexity prove the need for a deeper knowledge on wider prioritization and its' application.

3.2. Main and alternative methods of process prioritization

Prioritization typically is defined as a two-stage procedure of evaluating a group of items and later ranking them in order of importance, urgency or others selected criteria (Cambridge Dictionary, 2018). It is recognized that in order to fully evaluate the chosen process according to the prior set up, two main groups of indicators and their combinations need to be assessed: quantitative and qualitative. First of all, it is recommended to follow Lean methods and divide the selected process into two stages – AS-IS (ongoing process version) and TO-BE (future process version) – and after carry out a content analysis by following mixed 5 multidimensional criteria: scope, stability, standardization, integrity and influence of internal/external factors (Duan, 2009; Tomov, 2017; Helleno et al., 2015; Lacity and Willcocks, 2016). This categorization and later ranking are essential for both stages of the prioritization procedure:

1. Using the mentioned method for ongoing process assessment gives a status of relevant information not only about a specific process, but also about its relation among other processes or systems and overall value in organization (Barone et al., 2014);
2. Modeling future version of the process by using multidimensional criteria and centralized, integrated attitude also provides holistic insights about upcoming and needed changes in the organizational structure and/or focus areas, etc. (Yusupbekov et al., 2017).

In detail, content of 5 multidimensional criteria are showed in the Table 1.

Table 1. Multidimensional criteria for process evaluation before prioritization

Criteria	Implication content for ongoing process	Implication content for future process
Standardization	AS-IS process is evaluated by finding the answer to main orientation question: <i>What part of the process is standardized and based on rules and restrictions?</i> (Value in percentage recommended)	TO-BE ideal process should be based on standardized and constant flow, with limited human decision interaction and/or other exceptions
Integrity	AS-IS process is evaluated by finding the answer to orientation questions: What are the level and scope of process integrity with others processes and systems in organization?	TO-BE ideal process should be based on a low level of integrity with others process and systems in organization
Stability	AS-IS process is evaluated by finding the answer to orientation questions: Is schedule of process usage clear and constant? Are the content and/or environment of process stable?	TO-BE ideal process should be orientated to strict implementation and well defined environment and content
Scope	AS-IS process is evaluated by measuring quantitative indicators of process scope: frequency, start and end time, error rate, financial numbers.	TO-BE ideal process should be orientated to be clearly described regarding scope measurement related indicators: frequency, start and end time, error rate, financial numbers.

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Continue of Table 1

Criteria	Implication content for ongoing process	Implication content for future process
Influence of internal/external factors	AS-IS process should be evaluated by measuring of internal/external factors: human resource management, brand, quality control, etc.	TO-BE ideal process should be based on a low dependency both on internal and external factors.

Source: author's compilation based on Duan, 2009; Tomov, 2017; Helleno et al., 2015; Lacity & Willcocks, 2016; and Yusupbekov et al., 2017.

It is noticed that in practice there are alternative multi-criteria decision-making types of analysis too, which are successfully applied in prioritization procedure, for example adapting principles of rating scale of analytical hierarchy process (AHP) or elements from analytic network process (ANP) (Barone et al., 2014; Kadoić et al., 2017). Another option in this case is divide of the prioritization analysis into two parts: in the first part, the process content is evaluated by using a so called Process Assessment Heat Map (PAHM) method, and in the second part, the process is evaluated according to the method of relevance matrix called Process Categorization Map (CM) (Ohlsson et al., 2014). Both parts rely on 5 main criteria: positioning, relationship, preparation, implementation and proving. For a better situation assessment of the first part and overall context, methods of monitoring, interview type with stakeholders and Fuzzy analytic hierarchy process (FAHP) analysis are recommended (Babashamsi et al., 2016; Kevin, 2012). Regarding the Process Categorization Map (CM), its content is based on the same 5 evaluation criteria groups with addition of 3-level visual (color) measurement scale. Visualization of the method is provided in the Table 2, where red color marks processes with a highest potential or priority for changes (more than 50%), yellow color – medium potential-priority for changes (in range between 20% and 50%) while green color marks the lowest potential and priority for changes implementation.

Table 2. Visualization of the Process Categorization Map

Criteria of Evaluation	Evaluation
Positioning	Red
Relating	Green
Preparing	Red
Implementing	Red
Proving	Yellow

Source: authors compilation according to Ohlsson et al., 2014

When applied standard, this method is used for individualized assessments, one by one process analyses but it might serve for comparative analyses too. For both methods, it is also necessary to pay attention to a possible process' influence towards the organization strategy, as this criterion is one of the most important quantitative indicators during the prioritization process.

Regarding quantitative methods, it is firstly noticed, that this type of prioritization methods was a dominant for a long time in practice (Duan et al., 2009). It is mostly related to Benefit-Cost

Analysis (BCA) tools and Economic Valuation approach (Outwater et al., 2011; Ortega et al., 2014) based on such investment and resource savings indicators like:

1. Return of Investment (ROI). In detail, in business processes it is defined as a result of investment efficiency and can be measured in percentage by dividing a number of Net return of investment from a number of Cost of Investment (Barnett and Mattoy, 2010; Garvey et al. 2013).
2. Simple Payback Time (period). This indicator is measured in yearly numbers and calculated on the basis of the ratio of annual net investment comparing to annual net income. It is recommended to use this indicator due to several reasons: it shows reliability and stability of a project or process revenue, risk level to fail, easy to calculate and compare, helps to prioritize projects or process, as lower payback times show unpredictable earnings and easier forecasting (Ziem et al. 2014)
3. Savings of Full Time Equivalent (FTE) which stands for a way for employers to measure current and future numbers of full-time employees. Simple FTE calculator tools are used to get the mentioned number by dividing a number of actual hours worked by specific employee per period (for example per week) from full time hours for specific role per same period.

As mentioned above, these are commonly used indicators, but, for implementing an objective prioritization procedure, it is necessary to include a mixed, multidimensional and multiple criteria calculation methods (for example Multi-criteria Decision Analysis (MCDA), Multi-criteria Risk Assessment matrix or Critical Path Method (CPM)) as well as splitting the process into separate stages for evaluation (Almeida et al., 2012; Garvey et al., 2013; Ziem et al., 2014).

3.3.Process prioritization effect for Mass Customization

It is recognized that modern process prioritization methods, which are applied in process automation practices, can also be properly adjusted to Mass Customization processes (Piller and Kumar, 2009; Spahi, 2008). To be more specific, taking prioritization as an essential step helps to evaluate and select the most appropriate point of customer involvement, also known as Order Decoupling Point. Here, prioritization methods prove the content of the customization level index, called Magnitude of Customization (MOC), and are directly linked to the Customization Scale (CS) (Liu et al. 2014; Spahi, 2008). In a broader context, application of standard qualitative and quantitative prioritization criteria or the use of combined multidimensional evaluation criteria or methods provides useful insights for development of the Infrastructure for Mass Customization (IFMC) and design (of product or service content) for Mass Customization (DFMC) as well as enables a more detailed planning of resources on related areas (for example, sales and marketing)

and development of these areas. As a practical example, by Jerry Wind and Arvind Rangaswam (2001) presented a customerization strategy should be mentioned. It is considered to be a combination of mass customization and customized marketing (Spahi, 2008).

In general, usage of prioritization methods helps to assess a potential profitability of customer orders, its alignment to existing production lines and service infrastructure capacity as well as qualitative order requirements (Kirkham et al. 2014; Feng et al., 2009; Liu et al. 2014). The evaluation mentioned above uses a simple decision-making scale based on three prioritization statuses: accept, reject, consider (Xu et al., 2016). However, at the same time, in practice the scale of 9 mixed indicators is used, and the relation of results and customization (Capability of MC) is taken into account (Spahi, 2008). This method allows evaluating not only the mentioned aspects of infrastructure, quality requirements and profitability, but also possible production costs (delivery time, production volume and process stability, effect of individualization on the product price) too (An et al., 2015; Feng et al., 2009). Furthermore, it is important to note that prioritization not only creates conditions for identifying weak points of the process in the organization, allow rationally evaluating the need for additional resources and allocation of existing ones, but also makes a significant contribution to the initial stage of preparation for the stage of Design for mass customization (DFMC) (Zebardast et al., 2013). At this stage, using the Multi-criteria Decision Analysis (MCDA), Process Assessment Heat Map (PAHM or similar methods, the following actions are performed:

a) Overall status update based on analysis of existing processes and systems and their preparation for customization related changes (Almeida et al., 2012);

b) Case study based on analysis of conditions for customization of the selected product or service (for example, process volume, customer engagement, customer relationship management, response time, technical implementation capability, etc.). In general, mentioned assessment has a different influence both to customer and organization and depends on a type of customization.

Table 3. Prioritization influence in 4 types of mass customization

Type of customization	Influence to customer	Influence to organization
Collaborative Customization	+	+
Adaptive Customization	+	-
Cosmetic Customization	-	+
Transparent Customization	+	+

Source: author's compilation according to Spahi, 2008; Skačkauskienė and Davidavičius, 2015

As can be seen from the Table 3, in the case of Collaborative Customization, mutual benefits of prioritization are achieved. First of all, the positive effect here is a responsibility transfer to the end user, where a customer is enabled to modify an existing product or service, to select the most appropriate product or service design and content characteristics for it; in this way prioritizing is

dependent on a user. Secondly, from the perspective of the organization, the benefits are: a) saving time and human resources for the market and consumer monitoring, data collection and later analysis of needs and priority clarification of the target audience; b) monitoring results of ongoing consumer behavior actions or overall trends which can be used for modeling long term goals and adjusting the long-term operational strategy accordingly (Spahi, 2008; Skačkauskienė and Davidavičius, 2015). In the Adaptive Customization type, prioritization is performed during a process within an organization, in short, at a stage when submitting one final product or service version along with the integrated editing functionality that enables clients to express their priorities. In this case, although the prioritization phase requires additional resources from organizations, a consistent and detailed market and consumer analysis as well as related prioritization actions allow achieving better savings at the production stage, by focusing on one major version of the product or service (Spahi, 2008; Skačkauskienė and Davidavičius, 2015). Moreover, taking into evaluation the Cosmetic Customization, possibilities of prioritization and benefits of its application on both sides are limited: typically, a standard service or product is provided to a client and it can differ only judging its external characteristics. In addition, this selection relatively guarantees lower operating costs for the organization, but, in parallel, it increases dependence on market and consumer needs as well as trend dynamics. Regarding Transparent Customization, prioritization is also mutually beneficial, i.e. a customized product that meets specific needs is provided to a customer, however, it lacks a direct announcement about the presence of individualization and customization directly to the user (Skačkauskienė and Davidavičius, 2015). This type of prioritization is rather beneficial not only due to an increased level of customer orientation and implementation of value co-creation concept both with users and partners, but also due to a real input for a general process optimization. It can be achieved by eliminating non-value creating activities in the process following consumer feedback analysis and market monitoring as well as identified process losses (Hellen et al., 2015).

In summary, it should be noted that assessment, application, alignment of prioritization methods and principles with the Mass Customization concept not only improve sales indicators or product interface and content elements, but also ensure a better user experience in relation to the organization, prepare for unexpected consumer and market circumstances.

4. Conclusions

This particular analysis on process prioritization methods, their content and combined application confirms the value and importance of this process stage not only for planning and optimization activities, but for business (production or service) transformation activities, better known as mass customization, as well. It is significant to note, that prioritization methods are easy applicable, feature a clear content and are undoubtedly mutually beneficial for both organizations

and consumers, especially in cases of Collaborative and Transparent customization. Furthermore, the analysis of semantical meaning of mass customization concept has revealed a wide application of combined (integrated) and complex methods, shared processes and resources. It has been also noted that it is strongly recommended to prioritize combined (integrated) and complex methods by using not only standard cost-saving oriented quantitative indicators but also qualitative ones and criteria based on customer experience and integration level. Finally, from the perspective of scientific research field, a demand for investigation on overall prioritization topic has been identified. In detail, what should be considered are modern data analysis tools, modern economic consumer behavior theories as well as specific analysis on prioritization role and need in the e-mass customization type.

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